

## CLAIMS

### WHAT IS CLAIMED IS:

1. A microfluidic analytical system for monitoring an analyte in a liquid sample, the microfluidic analytical system comprising:
  - an analysis module including
    - at least one micro-channel for receiving and transporting a liquid sample;
    - at least one analyte sensor for measuring an analyte in the liquid sample, each of the at least one analyte sensors being in operative communication with a micro-channel; and
    - at least one position electrode, each of the at least one position electrodes in operative communication with at least one micro-channel; and
    - a meter configured for measuring an electrical characteristic of the at least one position electrode, the electrical characteristic being dependent on a position of the liquid sample in the micro-channel in operative communication with the at least one position electrode for which an electrical characteristic is measured.
2. The microfluidic analytical system of claim 1 further including a timer in operative communication with the meter.
3. The microfluidic analytical system of claim 1, wherein the position electrode is in operative communication with the micro-channel such that a surface of the position electrode is exposed to the micro-channel.
4. The microfluidic analytical system of claim 1, wherein the position electrode is in operative communication with the micro-channel such that an insulating layer separates the position electrode from the micro-channel.
5. The microfluidic analytical system of claim 1, wherein the at least one position electrode includes a first position electrode and a second position electrode

with the first and second position electrodes in operative communication with a first micro-channel; and

wherein the meter is configured for measuring an electrical characteristic between the first and the second position electrode.

6. The microfluidic analytical system of claim 5, wherein the analyte sensor is disposed between the first position electrode and a second position electrode.

7. The microfluidic analytical system of claim 5, wherein the first position electrode and the second position electrode are downstream of the analyte sensor.

8. The microfluidic analytical system of claim 5, wherein the electrical characteristic is at least one of an impedance between the first and second position electrodes and a resistance between the first and second position electrodes.

9. The microfluidic analytical system of claim 1, wherein the at least one position electrode is in operative communication with the analyte sensor.

10. The microfluidic analytical system of claim 5 further including a third position electrode in operative communication with the first micro-channel and wherein the meter is configured for measuring an electrical characteristic between any two of the first, second and third position electrodes.

11. The microfluidic analytical system of claim 1, wherein the micro-channel includes at least one main micro-channel and at least a first and a second branching micro-channel.

12. The microfluidic analytical system of claim 11, wherein the at least one position electrode includes at least one position electrode in the main micro-channel, at least one position electrode in the first branching micro-channel and at least one position electrode in the second branching micro-channels and

wherein the meter measures an electrical characteristic between the position electrode in the main micro-channel and either of the position electrodes in the first and second branching micro-channels.

13. The microfluidic analytical system of claim 11, wherein the at least one position electrode includes at least two position electrodes in the first branching micro-channel and at least two position electrodes in the second branching micro-channels and

wherein the meter measures an electrical characteristic between either of the two position electrodes in the first branching micro-channel and the two position electrodes in the second branching micro-channel.

14. The microfluidic analytical system of claim 11, wherein the at least one position electrode includes a first and second position electrode configured in an interdigitated configuration.

15. The microfluidic analytical system of claim 11, wherein the at least one position electrode is a serpentine position electrode.

16. The microfluidic analytical system if claim 1 further including a bypass electrode.